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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,374	07/11/2003	Tadashi Narui	37026-88081	4918

22807 7590 01/11/2005

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EXAMINER

LEE, EUGENE

ART UNIT PAPER NUMBER

2815

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/618,374

Applicant(s)

NARUI ET AL.

Examiner

Eugene Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9, 12-15 and 21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 1-4 and 12-15 is/are allowed.
- 6) ☒ Claim(s) 5-9 and 21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 7/11/03
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

1. The election requirement filed 6/7/04 is withdrawn because of the preliminary amendment filed 10/15/03, and claims 1-9, 12-15, and 21 are pending.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 5 thru 9, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Alexander et al. 4,198,646. Alexander discloses (see, for example, Fig. 2) an imager (back-illuminated image sensor) comprising a lightly doped p-type epitaxial layer (semiconductor base of a first conductive type) 18, n-type collection nodes (charge accumulating units) 20, output diffusion (charge transfer unit) 24, and charge transport unit.

Regarding the “back-illuminated image sensor” in the preamble, see, for example, column 1, line 64-column 2, line 4 wherein Alexander discloses incoming backside illumination generates hole-electron pairs.

Regarding the limitation “charge transport unit”, see column 2, lines 8-15, wherein Alexander discloses a path (charge transport unit) is created for the migration of the collected charge carriers from the area adjacent the collection node to the output diffusion.

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Regarding claim 5 and the limitation “invalid charge discharging unit”, see column 5, lines 62-63, wherein Alexander discloses some signal charge dumped by clocking the bucket overload gates.

Regarding claims 6 and 7 and the limitations “dark current suppressing unit” and “excessive charge discharging unit”, see column 5, line 65-column 6, line 3, wherein Alexander discloses the eliminating the possibility of undesired charge overflow (dark current).

Regarding claim 8 and the limitation “charge transport unit applies a voltage”, see column 2, lines 3-13, wherein Alexander discloses a charge carriers are then read out by means of a charge transfer mechanism including a transfer gate which is biased.

Regarding claim 9, see Fig. 2, wherein Alexander discloses a lightly doped p-type epitaxial layer 18, which is surrounded by an n-type collection nodes (semiconductor region of said second conductive type) 20.

Regarding claim 21 and the limitation “spilt transport unit and split transfer unit”, see column 6, lines 65-column 7, line 57, wherein Alexander discloses charges transported and transferred through multiple detectors at different time intervals.

#### ***Allowable Subject Matter***

4. Claims 1 thru 4, and 12 thru 15 are allowed. The following is a statement of reasons for the indication of allowable subject matter: The references of record, either singularly or in combination, do not teach or suggest at least a back-illuminated image sensor comprising: a depletion prevention layer formed closer to said second-plane side than said charge accumulating

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units, the depletion prevention layer which prevents a depletion region around said charge accumulating units from reaching said second plane (claims 1-4).

The references of record, either singularly or in combination, do not teach or suggest at least a back-illuminated image sensor comprising: a barrier region provided on at least a part of transport paths of said signal charges formed between said charge accumulating units and said charge transfer unit, the barrier region which creates a peak of a potential barrier to block progress of said signal charges when no charge is to be transported and ensures full transportation of said signal charges by eliminating the peak of said potential barrier by said charge transport unit when a charge is transported (claims 12-15).

#### **INFORMATION ON HOW TO CONTACT THE USPTO**

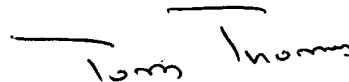
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eugene Lee  
January 7, 2004



TOM THOMAS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2815